

WHAT IS CLAIMED:

1. An isolated nucleic acid molecule selected from the group consisting of a nucleic acid molecule comprising the sequence of SEQ ID No.1 (the nucleotide sequence of the p70 β^{S6k}); and a nucleic acid molecule which encodes a p70 β^{S6k} and which hybridizes to a nucleic acid molecule having the sequence of SEQ ID No.1 under stringent conditions.
2. An isolated nucleic acid molecule which encodes a protein having SEQ ID No.2 (the p70 β^{S6k}) or a protein having one or more conservative amino acid substitutions in SEQ ID No.2.
3. An isolated nucleic acid molecule selected from the group consisting of a nucleic acid molecule comprising the sequence of SEQ ID No.1 (the nucleotide sequence of the p70 β^{S6k}); a nucleic acid molecule which encodes a p70 β^{S6k} and which hybridizes to a nucleic acid molecule having the sequence of SEQ ID No.1 under stringent conditions; and a nucleic acid molecule at least about 65% sequence identity with SEQ ID No.1.
4. An isolated nucleic acid molecule which encodes a protein having SEQ ID No.2 (the p70 β^{S6k}), a protein with at least 75% identity to SEQ ID No.2, or a polypeptide fragment of SEQ ID No.2.
5. An isolated polypeptide which phosphorylates a ribosomal S6 protein and is encoded by a nucleic acid molecule of claim 1 or claim 2.
6. A method of identifying an agent which modulates p70 β^{S6k} mediated phosphorylation of a ribosomal S6 subunit comprising the steps of:
exposing p70 β^{S6k} and a ribosomal S6 subunit to the agent; and

determining whether the agent modulates p70 β^{S6k} mediated phosphorylation of the ribosomal S6 subunit.

7. A method of modulating protein synthesis or cellular proliferation comprising the step of administering an agent which modulates p70 β^{S6k} phosphorylation of a ribosomal S6 subunit.

8. A method of identifying an agent that modulates a kinase or a phosphatase induced regulation of p70 β^{S6k} activity comprising the steps of:
exposing p70 β^{S6k} and the kinase which phosphorylates p70 β^{S6k} to an agent; and
determining whether the agent modulates the kinase or the phosphatase induced regulation of p70 β^{S6k} activity.

9. The method of claim 8, wherein the kinase which phosphorylates p70 β^{S6k} is PKC.


10. A method of modulating protein synthesis or cellular proliferation comprising the step of administering an agent which modulates the phosphorylation of p70 β^{S6k} .

11. A method of modulating cell cycle comprising the step of administering an agent which regulates the ability p70 β^{S6k} to bind with a ligand.

12. An antibody or antibody fragment which specifically binds to an epitope of p70 β^{S6k} .

13. The antibody of claim 11, wherein the antibody is selected from the group consisting of a monoclonal antibody, human antibody, chimeric antibody, and humanized antibody.

14. An antibody of claim 11 wherein the epitope is a proline rich epitope of a p70 β^{S6k} protein.
15. A fusion protein comprising SEQ ID No.2 or a polypeptide fragment thereof fused to a heterologous protein.
16. A cell transformed with a nucleic acid molecule of any of claims 1-3.
17. A method of identifying a substrate of p70 β^{S6k} comprising the steps of: exposing p70 β^{S6k} or a polypeptide fragment thereof to an agent; and determining whether p70 β^{S6k} binds to the agent.
18. A method of identifying a substrate of p70 β^{S6k} comprising the steps of: forming a mixture comprising p70 β^{S6k} and a candidate agent; incubating said mixture under conditions conducive to phosphorylation by p70 β^{S6k} ; and determining whether the candidate agent is phosphorylated.
19. A method of identifying binding partners of p70 β^{S6k} comprising the step of incubating a first cellular extract with p70 β^{S6k} , activated variants of p70 β^{S6k} or a fusion protein of claim 15.
20. The method of claim 19 further comprising incubating a second cellular extract with p70 α^{S6k} , activated variants of p70 α^{S6k} or a fusion protein of p70 α^{S6k} and comparing the first and second cellular extracts.
21. A method of identifying binding partners of p70 β^{S6k} comprising the step of isolating a first cellular extract from a cell containing p70 β^{S6k} , activated variants of p70 β^{S6k} or a fusion protein of claim 15.

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22. The method of claim 19 further comprising isolating a second cellular extract from a cell containing p70 α^{S6K} , activated variants of p70 α^{S6K} or a fusion protein of p70 α^{S6K} and comparing the first and second cellular extracts.
23. An isolated polypeptide comprising an activated p70 β^{S6K} .
24. The isolated polypeptide of claim 23 further comprising a mutation of Threonine 401 to Aspartic acid.
25. An isolated polypeptide that preferentially binds to an activated p70 β^{S6K} of claim 23.
26. The isolated polypeptide of claim 25 that preferentially binds to an activated p70 β^{S6K} of claim 24. 
27. An antibody or antibody fragment that specifically binds to the isolated polypeptide of claims 25 or 26.
28. A method of determining whether a cell expresses aberrant cellular levels of p70 β^{S6K} comprising:
(a) determining the level of p70 β^{S6K} in a normal cell type;
(b) determining the level of p70 β^{S6K} in a test cell;
(c) comparing the level of p70 β^{S6K} in the normal cell to the p70 β^{S6K} level in the test cell.
29. The method of claim 28 wherein the level of p70 β^{S6K} is determined by finding the level p70 β^{S6K} RNA in a cell.
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30. The method of claim 28, wherein the level of p70 β^{S6k} is determined by finding the level of p70 β^{S6k} protein in a cell.
31. A method of determining whether a cell expresses aberrant cellular levels of a p70 β^{S6k} binding partner comprising:
- (a) determining the level of said binding partner in a normal cell;
 - (b) determining the level of said binding partner in a test cell;
 - (c) comparing the level of said binding partner in the normal cell to the binding partner level in the test cell.
32. A vector comprising the isolated nucleic acid of claim 2, operably linked to a promotor or transcription.
33. The vector of claim 32, further comprising one or more enhancers or upstream activating sequences.
34. The vector of claim 32, wherein the vector comprises pcDNA3.
35. A vector which encodes an activated p70 β^{S6k} of claims 23 or 24.
36. A DNA vector comprising a nucleic acid encoding a p70 β^{S6k} or an activated p70 β^{S6k} fusion protein.

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